

## Original Communication

Death certification practices of forensic physicians within  
the Strathclyde region of Scotland, UK

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**Abstract**

Data relating to the perceived and actual cause of death, in those dying in the community is sparse. This in part is related to how each country deals with death investigations and certification of death. Under common law in Scotland, sudden unexpected deaths are referred to the Procurator Fiscal. Autopsy is not always the final arbiter of truth. While actual figures are not available at present, anecdotally the police indicate that general practitioners (GPs) are often declining to attend or certify in the vast majority of cases. The purpose of this prospective observational study was to examine the certification practice of the forensic physicians working for Strathclyde Police. In conclusion, the results from this short study indicate that in cases where the cause of death for an individual, who died suddenly in the community and where an autopsy is deemed necessary, forensic physicians are no better or worse than a pathologist in predicting the underlying reason.

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**1. Introduction**

The conviction of Dr. Harold Shipman for murdering fifteen of his patients, and the audit of his practice carried out by Professor Richard Baker, have raised many issues about the certification of death by doctors.<sup>1</sup> Data relating to the perceived and actual cause of death, in those dying in the community is sparse. This in part is related to how each country deals with death investigations and certification of death. Even within the UK, two different systems exist, namely: referral to Her Majesty's Coroner in England, Wales and Northern Ireland and to the procurator fiscal in Scotland.<sup>2</sup>

In 1970 in the UK, 146,000 people died at home with their doctor certifying death. By 1980 the figure was 112,000; by 1990 this had dropped to 80,000; and by 2000 to 56,000, though much of this change is due to the development of the hospice movement. Changes to the

GP contract, with no payment made for a general practitioner to certify his patient, have further decreased the possibility of a doctor with adequate knowledge of the case history completing the certificate.<sup>3</sup>

People often die outside normal working hours. A death is very traumatic for all concerned and relatives may not be able to recall information immediately after the death that they subsequently, may remember. A recurring problem is when the sudden death report has been completed and the police officer then goes off duty for several hours; during which time the Fiscal or coroner's officer is trying to obtain further information. In addition, the general practitioner – an invaluable source of information, may be unavailable for a variety of reasons.<sup>4</sup>

Under common law in Scotland, sudden unexpected deaths are referred to the Procurator Fiscal. In comparison to the coroner system in England and Wales, there is a clearly defined list of reportable deaths (Table 1). Coroners in effect apply local rules in addition to a simple list of obligatory referrals.<sup>5</sup> The Procurator Fiscal however has no obligation to establish the precise cause of death, but

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Table 1  
Deaths reportable to the procurator fiscal

Violent, suspicious, unexplained	Occupationally related
Fault or neglect in another	Secondary to abortion/attempted abortion
Possible or suspect suicide	Death secondary to medical mishap
Resulting from an accident	Poisoning
Death from use of a vehicle	Notifiable infectious disease
Drowning	Death in legal custody
Burning, scalding, fire or explosion	Death of person or unknown residence
Deaths of children	Doctor unable to certify
Death at work	–

must investigate any sudden, violent, suspicious or accidental death, or death from an unknown cause reported to him.<sup>6</sup>

Necropsy rates continue to fall worldwide. In Scotland, the average hospital necropsy rate is 32%, representing a 57% decline from 1986 to 1994. In England and Wales in 1999, a third of deaths were referred to the coroner and 62% of these had a post mortem examination performed. In Scotland, 24% were referred to the PF and a 40% necropsy rate resulted.<sup>7</sup> However, according to Home Office statistics deaths reported to the coroner now account for a third of all deaths in England and Wales, having risen from 130,000 in 1970, to 201,000 in 1999. In 1999, 62% of the total referrals underwent post mortem examination under the legal authority of the coroner. This differs in Scotland and other parts of the world, where a “View and Grant” system of death certification exists. The View and Grant procedure involves a doctor performing an external examination of the deceased and certifying the cause of death, without dissection. The doctor does not have to be a trained pathologist. In Scotland, 24% of deaths are referred at present to the Procurator Fiscal, with 41% undergoing post mortem examination.<sup>2</sup>

Previous validation studies have identified wide variation between the autopsy and the corresponding death certificates. The higher rate of major disagreement between physician death certificates and autopsy findings in some studies may have been related to the inclusion of both medico-legal and medical hospital deaths; and to the inclusion of all causes of death. A possible bias in any validation study, which may accentuate the disagreement rate, stems from the fact that only deaths for which autopsies have been performed are eligible for study. If an autopsy were more likely to be performed when the cause of death was unclear, the extent of disagreement between death certificates and autopsy reports could be over represented. Therefore, the inaccuracy of the death certificate in an autopsy study may reflect the tendency to obtain autopsies selectively, in cases of uncertainty.<sup>8</sup>

Although the use of the international classification of disease (ICD) categories is a somewhat crude measure, in that it omits changes within the categories that have undoubted clinical implications, (e.g. acute myocardial

infarction changed to ruptured aortic aneurysm), it has a measure of objectivity that should facilitate comparison with other surveys.<sup>9</sup> It must be remembered that the autopsy is not always the final arbiter of truth. It only reveals anatomical changes and takes no account of functional and metabolic changes, which are often the immediate cause of death and may not always be directly related to the anatomical abnormalities present.<sup>10</sup> As autopsy rates fall, it is becoming increasingly important that doctors who complete the death certificate, make use of all available information to justify the cause of death they give on the certificate.<sup>1</sup>

For both small and large populations, the definitive assessment of our success at prolonging life is the age-adjusted mortality rate; the primary tool for measuring mortality rates is the death certificate.<sup>11</sup>

Most GPs will issue less than five death certificates a year, (unless they have responsibilities in nursing homes). This means they have little experience of the procedure and together with the fact that the junior staff normally have responsibility for appropriate completion of the death certificate, means the process as a whole, is poorly done.<sup>3</sup> Most physicians, do not receive formal training in determining the cause and manner of death, but are simply given this responsibility in their first twelve months of duty, following graduation from medical school.<sup>1,12</sup> For the rest of the doctor's career, no organization will review the quality of their death certification, or include this as a topic for post graduate training or examination, clinical governance, audit or for continuing professional development.<sup>1</sup> The doctor's place of residence and period of medical school education, may influence his choice of diagnoses in completing death certificates; death certification is a more subjective process than most doctors, or health statisticians would care to admit.<sup>13</sup> Could the past high incidence of deaths from coronary artery disease in Scotland, where autopsies are conducted in only about 9% of the population, compared with nearly 25% in England and Wales, be more a function of vagues in certification than actual pathology?<sup>14</sup> While the cause of death might be difficult to agree on sometimes, most problems with death certificates stem from failure to complete them correctly, rather than the underlying pathology.<sup>11</sup>

Within Scotland, the practice of death certification for sudden, unexpected death varies widely; for example, in the Strathclyde region when a person dies, the police are notified by the ambulance crew attending or by relatives. Alternatively, the relatives may contact the deceased's general practitioner directly. During normal working hours the police contact the general practitioner (if details are available), to obtain further information and to request if they are in a position to attend and provide a certificate. The certificate of death may be provided from either the person's general practitioner (or someone from the practice group), or a police surgeon (forensic medical examiner, forensic physician). While actual figures are not available at present, anecdotally the police are finding that GPs are

often declining to attend or certify in the vast majority of cases (citing Harold Shipman as the reason and suggesting they do not wish to assume the responsibility for completion of the certificate; or by declaring they have insufficient knowledge to be certain of the cause of death). The on call forensic physician is then contacted to attend the locus to examine the body, and if possible provide a certificate. Using all available information present such as prescription records, history from those present and scene examination, the doctor may be able to complete the medical certification without the need for an autopsy.

In comparison to Strathclyde, within the Grampian region of Scotland the police are not automatically notified of a sudden death in the community; unless it is deemed suspicious by the ambulance service, or the general practitioner called to provide a death certificate.

The purpose of this study was to observe the certification practice of the forensic physicians working for Strathclyde Police.

## 2. Methods

A prospective observational study method was chosen for simplicity. For a two week period from Monday 19th December 2005 to Monday 2nd January 2006, data for all deaths attended by forensic physicians was collected. This particular time of year was chosen to maximize data capture and to highlight the number of deaths reported to the police at a time when most general practitioners are closed for the holiday season. The age of the person, date and time of death and if a certificate was provided, including the cause of death given was noted. If a cause of death was not able to be given, then a presumptive cause of death was asked for and this was compared to the autopsy result. Suspected murder was not included as this is the remit of the on-call pathologist in this region.

## 3. Results

The deaths of 45 people were attended by Strathclyde police within the two week period. Sixteen were female (35.5%) and 29 were male (64.5%). The ages ranged from 19 to 97 years old. Certificates were issued by forensic physicians in 21 (46.6%) cases; the remainder being referred to the pathologist ( $n = 24$ , 53.4%). When the number of deaths that require obligatory referral to a pathologist (for reasons given in Table 1), are removed ( $n = 7$ ), the rate of certification from forensic physicians is 55% ( $n = 21$ ). There were no system errors made in the completion of the certificate by the forensic physicians.

Twenty-five deaths were referred onto the pathologist for further investigation. Twenty-three predictions were made, in two cases no cause of death could be given by the police surgeon. Fourteen out of 23 predictions were in agreement with the pathologist (60.9%). When the number of obligatory post mortems is removed ( $n = 7$ ) this figure drops to 30.4%. Table 2 gives the predicted cause of

Table 2

Prediction of cause of death and autopsy result

Forensic Physician Predicted Cause of Death	Pathologist's Certification of Death
Head Injury	Myocardial Infarction
1(a) Chest Infection	1(a) Pulmonary Thromboembolism
1(b) Chronic Obstructive Pulmonary Disease	1(b) Deep Venous Thrombosis
Unknown	1(c) Bronchopneumonia
	1(a) Acute Peritonitis
	1(b) Perforated Duodenal Ulcer
1(a) Chronic Alcoholism	1(a) Acute Alcohol Intoxication
1(a) Hypoglycemia	1(a) Coronary Atherosclerosis
1(b) Diabetes Mellitus	2 Diabetes Mellitus
1(a) Chronic Alcoholism	1(a) Drowning
	1(b) Alcohol Intoxication
	2 Coronary Artery Atheroma
1(a) Myocardial Infarction	1(a) Gastrointestinal Haemorrhage
	1(b) Chronic Alcohol Abuse
1(a) Pulmonary Thromboembolism	1(a) Bacterial Peritonitis
	1(b) Ascites
	1(c) Liver Cirrhosis
1(a) Myocardial Infarction	1(a) Hypertensive Heart Disease
Unknown	1(a) Ischaemic Small Bowel
	1(b) Peripheral Vascular Disease
	2 Ischaemic Heart Disease

death by the forensic physician and the certified cause of death by the pathologist, where the two differed.

For the reportable deaths, the forensic physician and pathologist were in 100% agreement (for death by hanging, heroin overdose, co-proxamol overdose and smoke inhalation).

Fig. 1 demonstrates the number of deaths (to the nearest hour), reported to forensic physicians.

## 4. Discussion

Many patients die at home often of a chronic illness, which might have been identified in the past, but in which the immediate cause of death is a complication whose precise characterization might require investigation which in the circumstances, would be meddlesome.<sup>10</sup> Doctors feel pressure from families and the fiscal system to make rapid decisions about the cause of death and this inevitably leads to errors, especially in the emergency department, where there is a lack of familiarity with the deceased. In a study of sudden deaths in accident and emergency, it was noted that many death certificates issued are supported by little evidence for the causes of death stated. Death certificates would appear to be completed on the basis of available clinical information, from the history, or after discussion with the family doctor or the Procurator Fiscal.<sup>15</sup>

Deliberate inaccuracies may be introduced, for example, in an attempt to keep AIDS or alcoholism off the death certificate. There is a reluctance to be accurate in certain conditions; in cancer the cause of death is often attributed to the primary disease, rather than the chemotherapy – a fact reflected in other forms of treatment including radical surgery.<sup>3</sup>

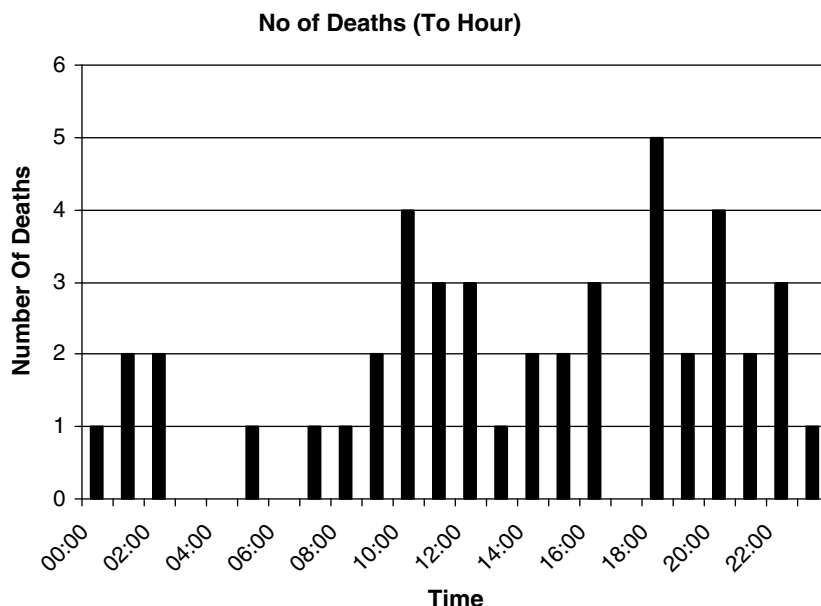


Fig. 1. Number of deaths attended by police surgeon to nearest hour.

In previous studies predicting cause of death prior to autopsy, the accuracy ranged from 39% and 46%; (most of which were cardiac related).<sup>2,8</sup> The overall sensitivity of the death certificate, in predicting an individual cause of death, has been reported as 0.47, with sensitivities ranging from 0.90 in the neurological system, to 0.28 in the cardiovascular system and the sensitivity for all malignant causes of death 0.65.<sup>16</sup>

In 1971, a study compared clinical diagnosis and autopsy findings in 471 patients who died in district general hospitals under the age of 50. The diagnosis was confirmed with no significant additional pathology.<sup>6</sup> The true rate of misclassification by the death certificate is likely to be between 7.9% and 24.3% overall and between 43.1% and 100%, for decedents 85 years of age and older. This is presumably a consequence of the obfuscation of signs and symptoms of disease that occurs with advancing age and the higher prevalence of multiple, co-morbid disease processes in older persons. Cardiac related deaths are over predicted by 20%. When deaths due to unknown cause are excluded from the analyses, the excess is approximately 8%.<sup>8</sup> These patients at post mortem were found to have died from pulmonary thromboembolism, highlighting the difficulty in clinically distinguishing between the two conditions. Patients whose predicted cause of death is anticipated to be of non-cardiac or non-poisoning origin, are often wrongly predicted.<sup>15</sup> Efforts to monitor the recent decline in mortality from heart disease in Australia have lead to the conclusion that, the broad category of ischaemic heart disease is fairly accurate and reliable, but that sub classification within this category is too unreliable for usual analysis.<sup>9,17</sup>

Infections, especially fungal and pulmonary emboli are recognized as some of the commoner, unexpected disease processes found at necropsy.<sup>18</sup> One previous study of 179 autopsies reported 44.9% with 1 or more undiagnosed

cause of death. The single largest category of undiagnosed causes of death at autopsy is infections.<sup>19</sup> Diagnostic accuracy does not increase with the length of time available for investigation prior to death and there are common diseases, in which clinical diagnoses are more often wrong than right.<sup>20</sup> No correlation has been found between age, sex, duration of in-hospital treatment, surgical intervention, clinical specialty, or necropsy request rates and incidence of unexpected findings in adult necropsies.<sup>18</sup>

In conclusion, the results from this short study indicate that in cases where the cause of death for an individual, who died suddenly in the community and where an autopsy is deemed necessary, forensic physicians are no better or worse than a pathologist in predicting the underlying reason. Limitations in this method were, the short time period of study and the lack of an autopsy in cases where the FP certified the cause of death. Additionally, deaths that involved the police were examined; those certified by the patient's own GP were not included. A future study, over a longer period and involving larger patient numbers for statistical analysis, is recommended. As in previous studies, it is often the more difficult cases which are referred on to have an autopsy, leading to selection bias. It has been shown however, that when a person dies after a long, well characterized illness, the cause of death on the death certificate is likely to be more accurate, than when a death is relatively sudden and unobserved.<sup>17</sup> The primary source of diversity in death certification, especially selection of underlying cause of death, has been attributed to differences in interpretation of the information, rather than differences in knowledge of death certification.<sup>21</sup>

One of the proposed changes to the current coroner's service is a reduction in the number of post mortems in England and Wales. One way in which a certificate of death could be provided is from the forensic physician who

attends the sudden death. The forensic physician is an independent examiner and is trained in death investigation. A model based upon the Procurator Fiscal service and forensic physician attendance at sudden deaths is one way forward to reduce the number of unnecessary post mortems for non-suspicious deaths in the community.

## References

1. Crowcroft N, Majeed A. Improving the certification of death and the usefulness of routine mortality statistics. *Clin Med* 2001;**1**(2):122–5.
2. Ruttly GN, Duerden RM, Carter N, Clark JC. Are coroner's necropsies necessary? A prospective study examining whether a "view and grant" system of death certification could be introduced into England and Wales. *J Clin Pathol* 2001;**54**:279–84.
3. Berry C. Death certification and Dr. Shipman. *Med Sci Law* 2003;**43**(3):193–4.
4. Sampson H, Johnson A, Carter N, Ruttly G. Information before coronial necropsy: how much should be available? *J Clin Pathol* 1999;**52**(11):856–9.
5. Smith DJ. Certifying and investigating deaths: the need for reform. 1. The shipman inquiry-death certification. *Med Sci Law* 2004;**44**(4):280–7.
6. Clarke C, Whitfield AG. The autopsy in deaths under fifty. *J Roy College Phys Lond* 1982;**16**(3):152–8.
7. Quigley M, Burton J. Evidence for cause of death in patients dying in an accident and emergency department. *Emerg Med J* 2003;**20**:349–51.
8. Lloyd-Jones DM, Martin DO, Larson MG, Levy D. Accuracy of death certificates for coding coronary heart disease as the cause of death. *Ann Int Med* 1998;**129**:1020–6.
9. Kircher T, Nelson J, Burdo H. The autopsy as a measure of accuracy of the death certificate. *New Eng J Med* 1985;**313**:1263–9.
10. Medical aspects of death certification. A joint report of the Royal College of Physicians and the Royal College of Pathologists. *J Roy College Phys Lond* 1982;**16**(4): 206–218.
11. Swain GR, Ward GK, Hartland PP. Death certificates: let's get it right. *Am Fam Phys* 2005;**71**(4):655–6. p. 652.
12. Magrane BP, Gilland MGF, King D. Certification of death by family physicians. *Am Fam Phys* 1997;**56**(9):1433–8.
13. Diehl AK, Gau DW. Death certification by British doctors: a demographic analysis. *J Epidemiol Commun Health* 1982;**36**(2):146–9.
14. Karch SB, Rutherford JD. Death certification in the UK. *J Roy Soc Med* 2003;**96**(9):425–7.
15. Mushtaq F, Ritchie D. Do we know what people die of in the emergency department? *Emerg Med J* 2005;**22**:718–21.
16. Singleton JD, Cottrell BJ. Analysis of the sensitivity of death certificates in 440 hospital deaths: a comparison with necropsy findings. *J Clin Pathol* 2002;**55**:499–502.
17. Lenfant C, Friedman L, Thom T. Fifty years of death certificates: the Framingham heart study. *Ann Int Med* 1998;**129**(12):1066.
18. Robinson IA, Marley NJE. Factors predicting cases with unexpected clinical findings at necropsy. *J Clin Pathol* 1996;**49**(11):909–12.
19. Nichols L, Aronica P, Babe C. Are autopsies obsolete? *Am J Clin Pathol* 1998;**110**:210–8.
20. Cameron HM, McGoogan E. A prospective study of 1152 hospital autopsies: I inaccuracies in death certification. *J Pathol* 1981;**133**:273–83.
21. Tsung-Hsueh L, Tai-Ping S, Meng-Chih L, Ming-Chih C, Chen-Kun L. Diversity in death certification: a case vignette approach. *J Clin Epidemiol* 1990;**43**(12):1285–95.